[redacted]

[redacted]

CLASSIFICATION CHANGE

To UNCLASSIFIED

By authority of GSFC 11652 dated 12/31/72

Changed by L. Shirley Date 12/31/72

Classified Document Master Control Station, NASA

Scientific and Technical Information Facility

Accession No 14601

SID-62-1003

Copy #2

PRELIMINARY SPECIFICATION

NASA FURNISHED

[redacted] CREW EQUIPMENT

INTERFACE REQUIREMENTS

PROJECT APOLLO

(U)

4.5.3.4

30 September 1962

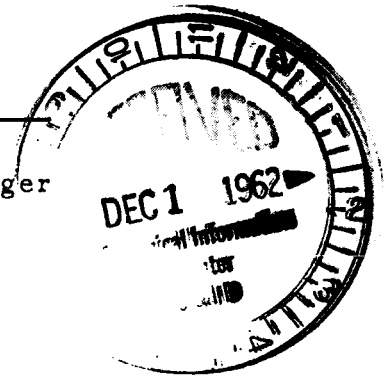
NAS 9-150

[redacted] AVAILABLE TO NASA HEADQUARTERS ONLY

Approved by

J. W. Paup

Vice President and Apollo Program Manager



NORTH AMERICAN AVIATION, INC.
SPACE and INFORMATION SYSTEMS DIVISION

[redacted]

[redacted]

CONTENTS

1. SCOPE

1.1 Scope. - This specification specifies the NASA-furnished crew equipment, referred to hereafter as GFCE, to be carried in the Apollo Spacecraft and the requirements to be incorporated in the GFCE to assure interface compatibility between the GFCE and the spacecraft subsystems and associated equipment of the spacecraft.

2. APPLICABLE DOCUMENTS

2.1 General. - The following documents form a part of this specification. Where the requirements of this specification conflict with those of the following documents, the requirements of this specification shall have precedence.

2.1.1 Non-Government Documents. -

Space and Information Systems Division of North American Aviation, Inc., (S&ID)

Specifications

SID 62-700-1	Preliminary Apollo Mission Requirements, dated 30 September 1962
SID 62-700-2	Preliminary Apollo Spacecraft Requirements Specification, dated 30 September 1962

3. REQUIREMENTS

3.1 Areas of Responsibility. -

3.1.1 Program Development Concept. - During GFCE development NASA will maintain program control and will provide program concepts. NASA will also evaluate the pertinent studies from S&ID and each GFCE contractor, integrate results, coordinate and determine concept selection and changes for feasible staging.

3.1.1.1 S&ID Responsibility. - S&ID shall conduct the studies and make available to the parties concerned, the vehicle and mission-imposed criteria which affect GFCE development.

3.1.1.2 GFCE Contractor Responsibility. - Under the direction of NASA, the GFCE contractors shall conduct development programs in order to meet the requirements of the vehicle development program, and shall conduct studies and generate and make available to the parties concerned, the criteria which will affect the vehicle and mission development.

3.1.2 Technical Development Concept. - NASA will monitor the technical development activities of S&ID and GFCE contractors, maintain development liaison and resolve technical problems which may arise, and which are not directly resolved between the parties concerned which may delay project progress. NASA will review and approve technical modifications, changes and revisions of work in progress, and disseminate technical direction. NASA will establish long-lead articles with the GFCE contractors and coordinate with testing schedules for delivery of end items in support of test readiness for spacecraft and module testing.

3.1.2.1 S&ID Technical Development Responsibility. - S&ID, in a joint effort with NASA, shall design, develop, and specify in detail the requirements for the GFCE spacecraft interfaces. S&ID shall furnish the GFCE contractors with vehicle interface requirements, monitor technical development work, maintain liaison, and provide interface logistical support as required. S&ID shall be responsible for advising NASA and GFCE contractors of potential changes to GFCE requirements and shall recommend initiation, curtailment, termination, or reorientation of any tasks as appropriate.

3.1.2.1.1 System Integration. - S&ID shall establish and ensure compliance with the physical interfaces of the spacecraft systems. S&ID shall be responsible for advising NASA of test scheduling, test readiness, and delivery requirements of the GFCE. NASA will monitor the physical interfaces and systems integration and will exercise final approval of functional interface integration. NASA will be responsible for test readiness of the GFCE for the spacecraft systems tests and will be responsible for advising S&ID of the readiness status and deliveries of the GFCE contractor equipment.

3.1.2.1.2 Representation. - S&ID shall provide the necessary space and support at their facility for personnel of NASA and the GFCE contractors. S&ID shall provide technical representation at the GFCE contractor's plant as required, to ensure full coordination of interfaces with GFCE contractor's engineering. The GFCE contractor shall provide technical representation at S&ID, as required, to ensure full coordination of interfaces with S&ID Apollo Engineering.

[redacted]

3.1.2.2 GFCE Contractor Development Responsibility. - Each GFCE contractor shall be responsible for advising NASA and S&ID of pertinent potential changes in design or design requirements, and for recommending to NASA the initiation, curtailment, termination, or reorientation of any tasks as appropriate.

3.1.2.3 Technical Coordination. - NASA, S&ID, and each GFCE contractor shall share jointly the responsibility for technical coordination and dissemination of technical data as required.

3.1.3 Design Responsibility. -

3.1.3.1 Design - Preliminary. - Each GFCE contractor shall conduct detailed studies in support of NASA and shall integrate crew functional requirements for the mission with the preliminary design task. Upon request of NASA, the GFCE contractors shall conduct detailed studies in support of S&ID, and S&ID shall conduct detailed studies in support of NASA. Upon request of NASA, S&ID shall conduct detailed studies requested by the GFCE contractor. S&ID shall determine crew functional requirements for the mission and GFCE-support vehicle subsystems.

3.1.3.2 Design - Final. - S&ID shall evaluate the final design and advise NASA with respect to interface problems and necessary implementations of both S&ID and GFCE contractor designs to ensure that designs are adequate in overall objectives. NASA shall have control to approve the final design of the GFCE contractors.

3.1.3.3 Design - GFCE Subsystems. - Each GFCE contractor shall provide the necessary resources to design, develop, fabricate, test, modify, and deliver GFCE that shall meet the requirements outlined in GFCE Assembly Development Statement of Work. Each GFCE contractor shall develop subsystems, where applicable, which will satisfy overall objectives. S&ID and NASA shall jointly monitor the subsystems development by the GFCE contractor. Interface problems shall be resolved by NASA.

3.1.3.4 Design - GFCE-Support Vehicle Subsystems. - If applicable, S&ID shall develop GFCE-support subsystems outside the vehicle which will satisfy Apollo Program objectives. All GFCE inflight checkout equipment not internal to the GFCE shall be provided by S&ID. The GFCE contractor shall review GFCE-support subsystems and advise NASA of their compatibility with GFCE system objectives.

[redacted]

3.2 Performance. -

3.2.1 Performance Requirements. - S&ID shall be responsible to NASA for formulating and establishing spacecraft performance requirements as related to the GFCE Spacecraft and mission objectives, if applicable.

3.2.2 Performance Analysis. - S&ID shall review the design and development of the GFCE and advise NASA of its compatibility with respect to interfaces with the spacecraft and the overall space mission. NASA will be responsible for conducting performance analysis and making final acceptability decisions for the GFCE. NASA shall be responsible for coordinating such results and decisions with the individual GFCE contractors and S&ID. The GFCE contractors shall be responsible for reliability and performance studies which will ensure compatibility with the integrated performance requirements as specified by NASA, and developed by NASA and S&ID.

3.3 Reliability. -

3.3.1 Reliability and Crew Safety. - S&ID shall allocate and apportion reliability and crew safety requirements at the system level, with NASA approval. The GFCE contractors shall be responsible for the reliability and crew safety requirements for those items and portions of interfaces for which they are responsible. The GFCE contractors shall establish a reliability and crew safety program which is compatible with the S&ID program. The GFCE contractor reliability programs shall be subject to NASA approval.

3.4 Operations and Storage. -

3.4.1 Ground Operation and Storage. - NASA shall control assignment of GFCE units, and shall designate apportionment of responsibilities for ground operations and storage. S&ID shall specify the design environment to which the GFCE may be subjected during handling, storage, shipment, and operational use.

3.5 Interface Requirements. - A series of specification tabs (Example: SID 62-1003, TAB A Pressure Garment Assembly) are attached to this specification to describe separately the interface criteria for each item of GFCE for compatibility with the installation requirements, space limitations, and governing mission requirements of the Apollo Spacecraft. The GFCE furnished shall be suitable for use under the conditions set forth in Specifications SID 62-700-1 and SID 62-700-2. The equipments involved in the interface requirements are as follows:

3.5.1 Space Suit Assembly (SSA). - The Space Suit Assembly will consist of an outer pressure garment assembly (PGA), an inner Constant Wear

Garment (CWG) and intermediate protective garments as determined by NASA. A Portable Life Support System (PLSS) with suitable quick disconnect provisions shall be considered as a part of the SSA. The following specification tabs, attached hereto, specify the requirements necessary to assure interface compatibility between the component items of the SSA, and the Apollo Spacecraft:

TAB A Pressure garment assembly

TAB B Portable life support system

TAB C Constant wear garment

3.5.2 Medical Equipment. - The crew medical equipment will consist of bio-instrumentation sensors, radiation dosimeters and clinical physiological monitoring devices. The following specification tabs, attached hereto, specify the requirements necessary to assure interface compatibility between the individual equipment items, and the Apollo Spacecraft:

TAB D Bio-instrumentation sensors

TAB E Clinical physiological monitoring devices

TAB F Radiation dosimeters

3.5.3 Personal Communications. - The personal communication system will provide line-of-sight voice communication between crew members while wearing the SSA. The following specification tab, attached hereto, specifies the requirements necessary to assure interface compatibility between the equipment, and the Apollo Spacecraft:

TAB G Personal communication subsystem

3.5.4 Other NASA-Furnished Crew Equipment. - The following tabs identify other NASA-furnished crew equipment:

TAB H Survival equipment

TAB I Recreation equipment

TAB J Exercise equipment

TAB K First aid equipment

Appropriate revisions to this specification will be made at a later date to delineate requirements with regard to these interfaces.

[redacted]ENTIAL

4. TESTING

4.1 Testing - GFCE Development and Qualification. - NASA shall be responsible for overall testing program control with respect to system development and interface liaison. S&ID shall be responsible for providing interface data during development testing. The GFCE contractors shall be responsible for development testing and test reporting as directed by NASA. The GFCE contractors shall expedite all qualification testing and be responsible for quality assurance and reliability with respect to the GFCE and GFCE subsystems. NASA shall be responsible for final approval of the GFCE and GFCE subsystems. S&ID shall review and make recommendations relative to the GFCE and GFCE subsystems. GFCE contractor test data and reports will be reviewed by NASA and S&ID.

4.2 Testing - Combined Systems. - S&ID shall be responsible for testing combined systems and shall direct the integrated spacecraft testing during all flight phases. S&ID shall be responsible for preparation of such test plans, and test schematics, test procedures and with NASA concurrence for assuring that each [illegible] are available. Thus, S&ID and NASA will [illegible] complete analysis of GFCE and spacecraft compatibility [illegible] GFCE documentation and equipment as required for the spacecraft test program.

5. DELIVERY SCHEDULES

5.1 Shipping. - S&ID shall [illegible] spacecraft components and test equipment.

6. NOTES

[redacted]

[redacted]

1. SCOPE

1.1 Scope.- This specification covers the interface requirements for the Pressure Garment Assembly (PGA) with the Apollo Spacecraft. The PGA is an integral component of the Space Suit Assembly (SSA).

2. APPLICABLE DOCUMENTS

2.1 Applicability.- The following document forms a part of this specification. Where the requirements of this specification conflict with those of the following document, the requirements of this specification shall have precedence.

2.1.1 Non-Government Documents

Space and Information Systems Division of North American Aviation, Inc., (S&ID)

Specification

SID 62-700-2	Preliminary Apollo Spacecraft Requirements Specification, dated 30 September 1962

3. REQUIREMENTS

3.1 General.- The PGA shall be compatible with the undergarment (which is part of the Constant Wear Garment) and the Portable Life Support System (PLSS) under environmental conditions which may be experienced during a typical 14-day space trip. The PGA shall be capable of satisfactory performance when exposed to the space environments described in specification SID 62-700-2. The most prominent use of the PGA will be in the Command Module; the most extreme use on the lunar surface. All requirements shall be governed by the fact that man is the prime factor in the total system. All aspects of the crew mission shall be considered in selecting the PGA configuration.

3.2 Helmet Assembly.- Head protection will be compatible with the Apollo seat and crash loads of 55 g for 0.01 seconds with eyeballs in, and physiological forward acceleration. Nutritional, defogging, regurgitation trap, and shielding provisions will be provided as necessary. The helmet will provide protection of the face from direct space sunlight while producing a

[redacted]

[redacted]

minimum of distortion for television viewing of the face of the crewman. The helmet will have shielding properties for protection against the space environment.

3.2.1 Vision.- Vision requirements to facilitate visual control in the Command Module will be integral with the helmet development. Unrestricted vision in the horizontal of 200 degrees plus 60 degrees up and 60 degrees down from standard line of sight without head movement will be required. The eye relief distance will be compatible with the use of the optical instruments provided.

3.2.2 Communications and Telemetry.- S&ID shall provide detailed performance requirements for earphones and microphones compatible with the communications system of the Apollo vehicle.

3.3 Special PGA Requirements.- The suit shall allow for:

(a) Eating

(b) Drinking

(c) Defecation

(d) Urination

(e) Regurgitation

3.4 Restraint Harness.- The restraint system may consist of a harness assembly integrated with the PGA. It may consist of simple access openings or passageways for strap extensions from an independent garment, or may consist of suit local reinforcements.

3.4.1 Restraint and Attachment Fittings.- Restraint methods, attachment fittings, or other features of the suit which are determined to be required to assure optimum suit spacecraft interfaces and integration shall be provided as needed by the spacecraft contractor. Restraint harnesses which are not permanently attached to the PGA shall be provided by S&ID.

3.5 PGA Components.- PGA components such as gloves, boots, outer surfaces, visors, etc., shall be the responsibility of the PGA contractor. Related spacecraft items such as control knobs, foot control surfaces, etc., shall be the responsibility of S&ID.

3.6 Umbilical Connections.- Umbilicals connected from the PGA to the spacecraft's ECS normally provide PGA environmental control and communications. Umbilicals connected from the PGA to the spacecraft's ECS shall be provided by S&ID.

[redacted]

3.7 PGA/Spacecraft Electrical Disconnects.- The disconnects shall be specified by S&ID. When a portion of an electrical plug is a part of the PGA, that portion shall be provided by the PGA contractor.

3.8 PGA/Spacecraft Fluid-Carrying Disconnects.- Fluid-carrying disconnects shall be specified by the PGA contractor. When a portion of fluid carrying disconnect is part of the spacecraft, that portion shall be provided by S&ID.

3.9 Accessories.- The design of the PGA shall permit use of various accessories such as portable lights, tools, cameras, scientific instruments, etc., and appropriate attachments for their use during extra-vehicular operation. These accessories will be furnished by S&ID or NASA. The attachments and provisions for these accessories will be defined by S&ID and shall be incorporated into the PGA by the PGA contractor after NASA review and approval.

3.10 Command Module Ingress and Egress.- The PGA with the PLSS attached shall allow direct unassisted ingress and egress to the Apollo Command Module while inflated or uninflated. The pressurized PGA shall allow unassisted Command Module ingress and egress through the overhead hatch. (See Figure 1.)

3.10.1 Additional Egress Considerations.- Consideration will be given within the early stages of the Command Module development to provide for the use of personal parachutes. Provisions will be made for protective measures as required during parachute descent.

3.11 Inflight Storage.- The PGA will be designed to be stored in the smallest possible space. Considerations for folded PGA storage, or flat PGA storage, will be examined early in the development program to ensure coordination with the vehicle development. Undonned parts of the PGA will be stored in a location, or locations, easily accessible to each crewman in the event that emergency use is warranted. Provisions shall also be made for the storage of PGA maintenance items and spare parts.

3.12 Suit Life.- The PGA shall be designed to perform satisfactorily without major overhaul after being donned, worn, and removed as many times as required for prelfight checkout and inflight operation for a number of missions to be determined by NASA.

3.13 Maintenance.- The PGA contractor shall determine and recommend to NASA provisions for PGA maintenance. S&ID will review NASA-directed provisions and insure that they are compatible with overall Apollo mission requirements.

[redacted]

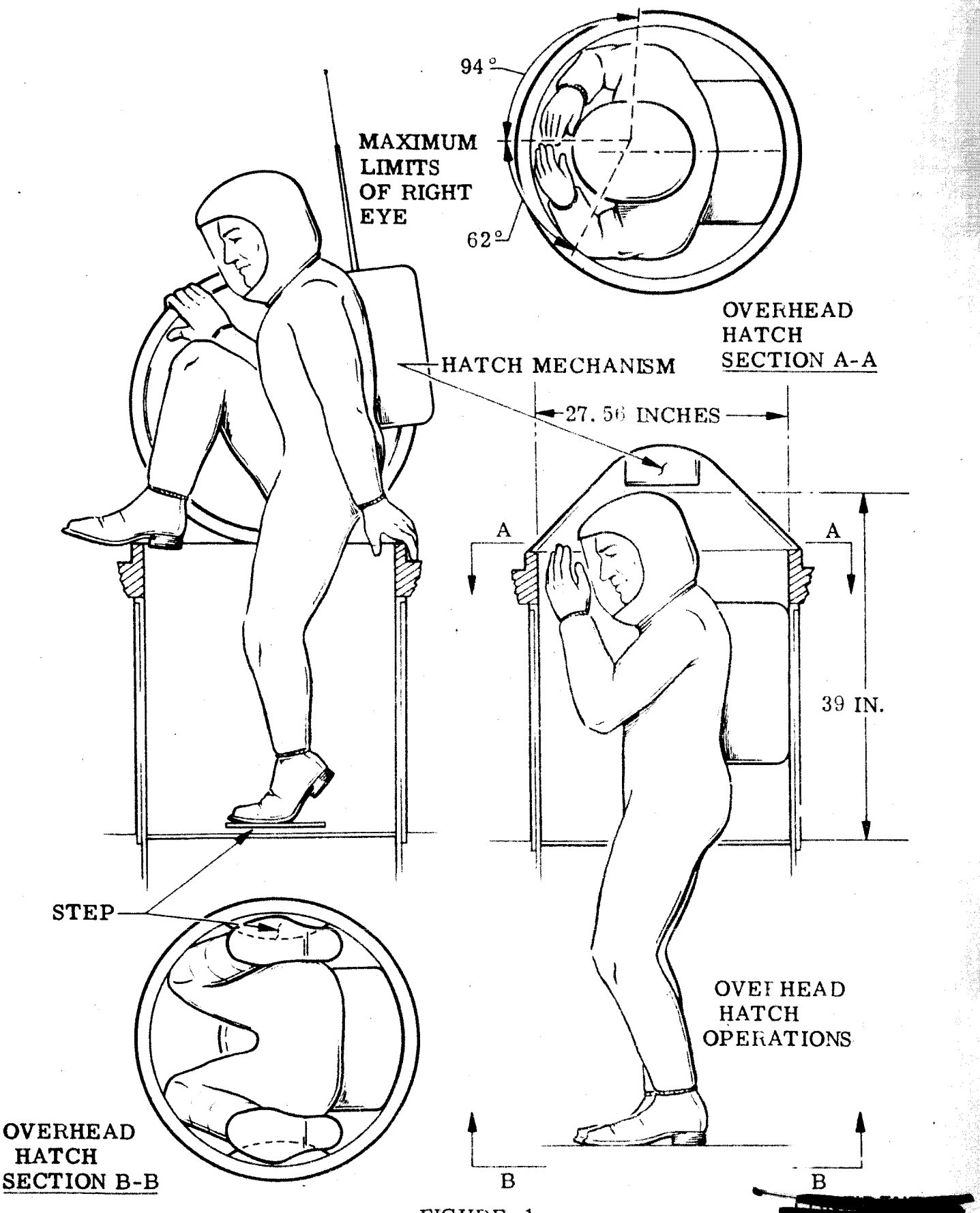


FIGURE 1
OVERHEAD HATCH INGRESS-EGRESS

[redacted]

3.14 Spare Parts.- The PGA contractor shall determine and recommend to NASA the provisions for PGA maintenance.

3.15 Suit Mobility.- The PGA shall permit reasonably unrestricted mobility while performing all required tasks within the design limits of the Apollo vehicle. When pressurized to 3.5 psig, the suit will allow a crewman to open and enter the Apollo hatch and to enter the crew compartment from the hatch unassisted. The inflated suit will allow the occupant easy ingress/egress to the seat. Hand dexterity will allow apposition of the thumb with each finger. Wrist articulation will be sufficient to operate a side-arm controller throughout its entire range. Mobility requirements to satisfy the anticipated intra/extravehicular crew activities shall be met.

3.16 Ventilation.-

3.16.1 Ventilation.- Ventilation will be provided to all portions of the suit extremities and will accomplish thermal equilibrium through convection methods when attached to the Spacecraft ECS. The suit inlet valve will be guarded against functional failure during post-landing immersion.

3.16.2 Flow Characteristics.- The ventilation flow characteristics of the PGA when attached to the Spacecraft ECS shall be as shown in Figure 2. NASA and S&ID shall study the problem of convection cooling and the effects on other Spacecraft systems of various methods of controlling body heat loads. S&ID has transmitted a water management curve compatible with the NASA Spacecraft Work Statement and to which S&ID is currently designing Apollo systems.

[redacted]

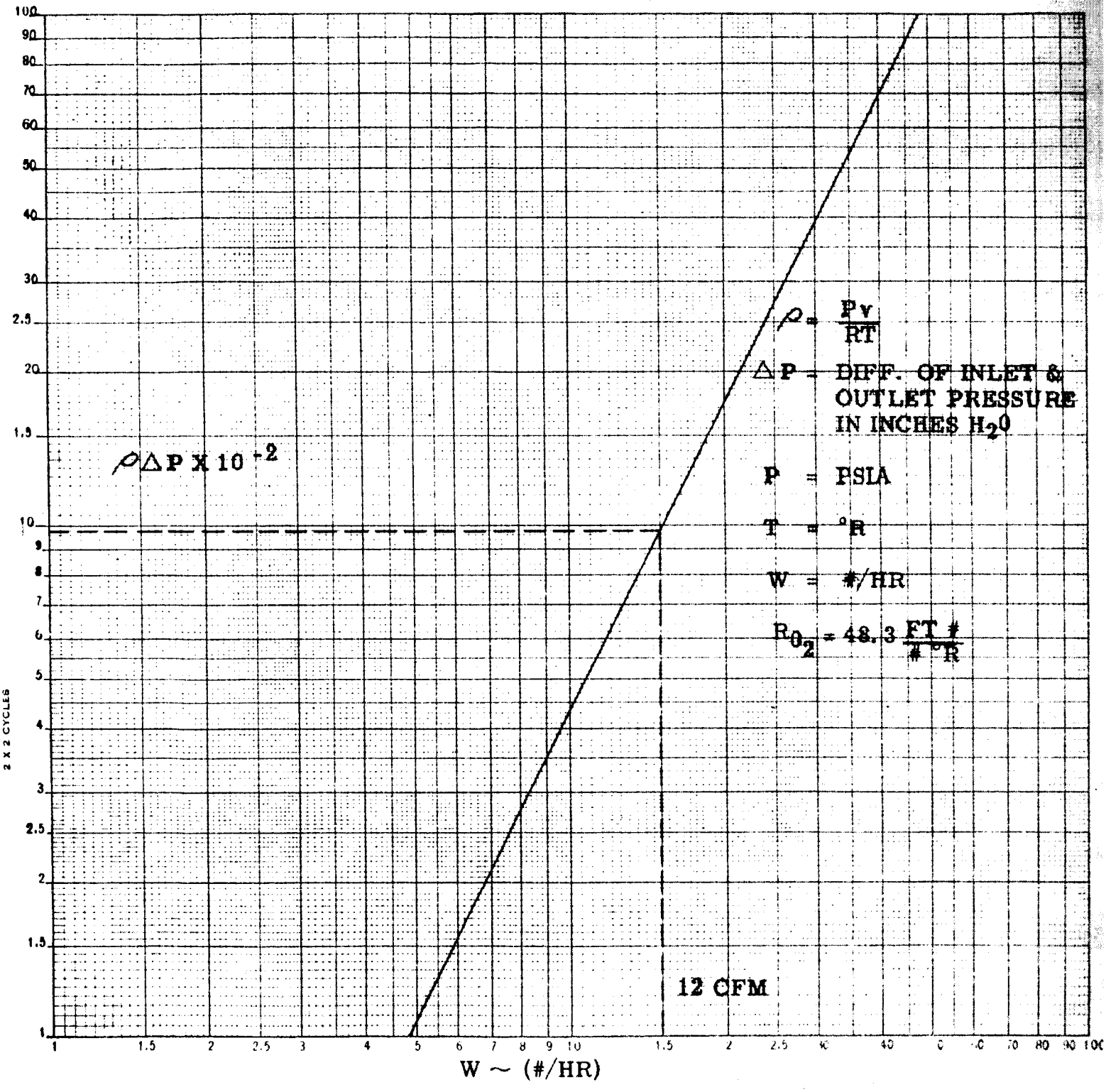


FIGURE 2
CHARACTERISTIC CURVE FOR SUCTION FLOW

[redacted]

1. SCOPE

1.1 Scope. - This specification covers the interface requirements for the Portable Life Support System (PLSS) with the Apollo Spacecraft. The PLSS is an integral component of the Space Suit Assembly (SSA).

2. APPLICABLE DOCUMENTS

2.1 General. - The following document forms a part of this specification. Where the requirements of this specification conflict with those of the following document, the requirements of this specification shall have precedence.

2.1.1 Non-Government Documents. -

Space and Information Systems Division of North American Aviation, Inc., (S&ID)

Specification

SID 62-700-2	Preliminary Apollo Spacecraft Requirements Specification, dated 30 September 1962

3. REQUIREMENTS

3.1 General. - The Portable Life Support System (PLSS) will require compatibility with a Pressure Garment Assembly (PGA), a radiation intermittent wear overgarment, if applicable, and a typical fourteen-day space trip with multiple environments under which the PLSS will be used. The most prominent use will be that of supplying a habitable environment external to the Command Module. All requirements shall be consistent with the philosophy that man is the prime design entity in the total system. Integration with all aspects of the crew mission should be considered in determining the suit configuration. The PLSS shall provide an artificial environment that will enable a crewman to perform tasks outside of the Apollo Spacecraft and withstand exposure to the hostile environments of extra-terrestrial space as described in SID 62-700-2. The PLSS shall replace the umbilicals which are connected from the Pressure Garment Assembly (PGA) to the Apollo Spacecraft Environmental Control System and which normally provide PGA environmental control and communications.

[redacted]

3.2 PLSS Recharge. - The PLSS will be designed to be rechargeable with all expendables, such as O_2, water, electricity, noxious gas and CO_2 removed from available Spacecraft supplies. The design objectives of the SSA shall be to permit recharging of the PLSS by one man while wearing a pressurized SSA.

3.2.1 Recharge Responsibilities. - Where recharging of the PLSS expendables, i.e., water, O_2, and electricity, from a spacecraft supply is involved, the connectors shall be specified by S&ID. When part of the SSA, the specified connectors shall be provided by the SSA contractor.

3.2.2 Emergency Use of Portable Life Support System (PLSS). -

3.2.2.1 Dual Use. - Emergency use of one PLSS by two crewmen or two PLSS by one crewman shall be possible. The emergency attach hardware shall allow one crewman to carry another on his back, or allow two crewmen to walk single file or side-by-side.

3.2.2.2 Back-Up Use. - Consideration should be given to using the PLSS as a back-up, rechargeable, ECS system in the event of certain failures of the vehicle ECS system.

3.2.3 PLSS Donning. - The PLSS will allow a crewman to don or doff the equipment without assistance from another crewman.

3.2.4 PLSS/Spacecraft Fluid-Carrying Disconnects. - Fluid-carrying disconnects shall be specified by the PLSS contractor. When a portion of a fluid-carrying disconnect is part of the spacecraft, that portion shall be provided by S&ID.

3.2.5 PLSS Walk-Around Capability. - The PLSS will provide not less than a four-hour walk-around capability for lunar exploration or for unscheduled in-flight maintenance on the exterior of the spacecraft during mission transit.

3.2.6 Operations and Storage. -

3.2.6.1 In-Flight Storage. - PLSS design shall be such as to facilitate in-flight storage of the PLSS along with maintenance items and spare parts for the PLSS.

3.2.7 Maintenance. - The PLSS shall require minimum maintenance. The PLSS contractor shall determine and recommend provisions for PLSS maintenance to NASA. S&ID will review NASA-directed provisions to insure compatibility with overall Apollo mission requirements.

3.2.8 Spare Parts. - The PLSS contractor shall determine and recommend to NASA the spare part requirements for PLSS maintenance.

3.2.9 PLSS/Spacecraft Electrical Disconnects. - The disconnects shall be specified by S&ID. When a portion of an electrical plug is a part of the PLSS, that portion shall be provided by the PLSS contractor.

3.2.10 Umbilicals. - Umbilicals connected from the PLSS to the spacecraft's ECS shall be provided by S&ID. The umbilicals will normally provide PGA environmental control and communications.

3.2.11 PLSS Removable Cartridges. - The design objective of the spacecraft and PLSS shall be to use a common noxious gas and CO_2 removal cartridge. If this objective is met, the cartridge shall be provided by S&ID.

1. SCOPE

1.1 Scope. - This specification sheet covers the interface requirements between the Constant Wear Garment and the Apollo Spacecraft. The Constant Wear Garment (CWG) is an integral component of the Space Suit Assembly (SSA).

2. APPLICABLE DOCUMENTS

2.1 Applicability. - The following document forms a part of this specification. Where the requirements of this specification conflict with those of the following document, the requirements of this specification shall have precedence:

2.1.1 Non-Government Documents. -

Space and Information Systems Division of North American Aviation, Inc., (S&ID)

Specification

SID 62-700-2	Preliminary Apollo Spacecraft Requirements Specification, dated 30 September 1962

3. REQUIREMENTS

3.1 General. - The Constant Wear Garment (CWG) is a close-fitting under garment which will be worn by the crewmen at all times and shall constitute their primary clothing.

3.2 Environment. - The Constant Wear Garment (CWG) will be worn under the Pressure Garment Assembly (PGA). The CWG will also be worn as the primary clothing in a shirtsleeve environment.

3.3 Functional Usage. - The CWG will integrate functions of comfort, minor impact and/or abrasion protection, hygiene, and bio-monitoring.

3.4 Potential Snag Areas. - The CWG will be as free as possible of potential snag areas.

[redacted]

3.5 Urination and Defecation. - Appropriate provisions will be made in the CWG for urination and defecation.

3.6 CWG In-Flight Storage. - The CWG will be designed to be stored in the smallest possible space. Considerations for folded storage, or flat storage, will be examined early in the development program to ensure coordination with the vehicle development.

3.7 CWG Clothing Changes. - Extra CWG changes will be stored in an easily accessible location.

3.8 Ventilation. - The CWG shall permit adequate ventilation in accordance with the ventilation requirements of the Pressure Garment Assembly (PGA) to support crew health and well-being.

3.9 CWG Donning. - The CWG shall allow quick and easy donning during missions within the confined area of the Apollo Spacecraft Command Module.

3.10 CWG Mobility. - The CWG shall be designed to facilitate the maximum mobility possible and permit crew performance of intra/extra vehicular mission task assignments with maximum efficiency. CWG mobility shall be compatible with requirements imposed by the wearing of the Pressure Garment Assembly (PGA) over the CWG.

3.11 CWG Life. - The CWG shall perform satisfactorily after being donned, worn, and removed as many times as necessary for conformance with mission requirements and task assignments.

[redacted]

1. SCOPE

1.1 Scope. - This specification describes the interface requirements of the bio-instrumentation sensors and the spacecraft subsystems.

2. APPLICABLE DOCUMENTS. - To be determined

3. REQUIREMENTS. - The interface requirements for the bio-instrumentation sensors have not been determined. Possible interface problems may exist in areas such as:

Signal amplification

Signal conversion

Signal transmission (continuous or stored and periodically transmitted).

Electric disconnects on space suit.

[redacted]

1. SCOPE

1.1 Scope. - This specification describes the interface requirements for the clinical physiological monitoring devices to be used by the Apollo crew members to obtain data on the effects of space on the crew.

2. APPLICABLE DOCUMENTS. - To be determined.

3. REQUIREMENTS

a. The interface requirements for the clinical physiological monitoring devices have not been determined. The devices being considered are:

Clinical Thermometer
Sphygomanometer
Stethoscope

b. Possible interface problems may exist in areas such as:

Physical Characteristics

Size of scale gradations
Visibility
Positive means of holding instrument
Protective stowage requirements

Human Factor Interfaces

To be determined.

1. SCOPE

1.1 Scope. - This specification describes the interface requirements for the radiation dosimeters and the crewmen.

2. APPLICABLE DOCUMENTS. - To be determined.

3. REQUIREMENTS. - The requirements for the radiation dosimeters have not been determined. Possible interface requirements may exist in the following areas:

Physical characteristics.

Size of indicator markings.

Method and place of attachment to crewman or suit.

[redacted]

1. SCOPE

1.1 Scope.- This specification describes the interface requirements of the NASA-furnished personal communications equipment with the Apollo spacecraft subsystems.

2. APPLICABLE DOCUMENTS

2.1 Applicability.- The following document forms a part of this specification. Where the requirements of this specification conflict with those of the following document. the requirements of this specification shall have precedence.

2.1.1 Non-Government Documents.-

Space and Information Systems Division of North American Aviation, Inc., (S&ID)

Specification

SID 62-700-2	Preliminary Apollo Spacecraft Requirements Specification, dated 30 September 1962

3. REQUIREMENTS

3.1 General.- The personal communications system requires interface compatibility between each crew member and the spacecraft communications subsystem.

3.2 Environmental Capabilities.- The Personal Communications System shall be capable of satisfactory performance when exposed to the hostile environments of space as described in Specification SID 62-700-2.

3.3 Physiological Data.- The personal communications system shall be capable of transmission of physiological or environmental data simultaneously without interference. The system shall provide the above capabilities without the use of hardline connections between the crew members and the Command Module. However, hardline connections shall be available for use when required, and shall be compatible with those connections on the Apollo Spacecraft.

[redacted]

3.4 Operating Frequencies.- The personal communication system shall operate as a duplex system. Operating frequencies shall be selected to afford compatibility with spacecraft communications equipment (Transceiver Control Station and VHF/AM Transceiver).

3.5 Principal Components.- The principal components of the personal communications system will consist of a headset group, and a transceiver for each crew member.

3.5.1 Headset Group.- Each headset group shall contain dual microphones and dual earphones. A headset shall be connectable through the intercom to any voice receiver and/or voice transmitter without interference with the other headsets. Provisions shall be made for hardline connections between the space suit communications headset and the Command Module communication system for operation inside the Command Module.

3.5.2 Transceiver Control Station.- The transceiver control station shall be integral with the Command Module intercommunication system. The personal communications systems shall be capable of actuating the Command Module intercommunications emergency override circuitry.

3.5.3 Transceiver.- The transceiver shall provide voice communication at 243 mc with a 100 mw minimum output. Power requirements shall be provided by the power pack. The battery shall be rechargeable from the spacecraft electrical power system.

3.6 Interface Requirements.-

3.6.1 Interphone.- The interphone interface between the Space Suit Assembly (SSA) and hardline connection to the VHF/AM spacecraft transmitter or the transceiver will be the disconnect at the umbilical of the Constant Wear Garment. Refer to Specification SID 62-1003, TAB C.

3.6.2 Transceiver.- The transceiver shall have disconnect provisions compatible with the interphone umbilical, the bio-medical sensors disconnects, and with the Command Module electrical subsystem.

3.6.3 VHF Recovery Mode.- Provisions shall be incorporated into the personal communications system for remote control of the VHF Recovery Beacon to guarantee voice communication capability under Command Module circumstances (the VHF Recovery Beacon has 72 hours operating requirement). The same approach and/or circuitry may be used at that specified in paragraph 3.5.1.

3.6.4 Battery Recharge.- The personal communications power pack (batteries) shall automatically be recharging when the umbilical (hardline) between the personal communications equipment and the Command Module is connected or when the umbilical from the space suit is connected to the Command Module.

[redacted]TIAL

1. SCOPE

1.1 Scope. - This specification describes the interface requirements for the survival equipment to be used by the Apollo Spacecraft crew members.

2. APPLICABLE DOCUMENTS. - To be determined.

3. REQUIREMENTS

3.1 Physical Interfaces. - The physical interfaces required of the survival equipment for compatibility with the spacecraft shall be as follows:

3.1.1 Storage Volume. - The total volume allotted stowage of the survival equipment shall be 3.45 cubic feet.

3.1.2 Weight. - The weight of the survival equipment shall not exceed 102 pounds.

3.1.3 Individual Survival Equipment. - In the event individual crew member survival kits are required, the configuration of the kit shall be compatible with the 4" x 14" x 16" envelope located in each crew couch.

3.1.4 Parachute Harness Attachment. - The means of attachment of individual survival kits shall be compatible with the attachment provisions of the personal parachute harness.

3.2 Human Factors Interfaces. - When attached to a crew member, the individual survival kits shall not restrict the crew member from performing normal operations, as required.

3.3 Environmental Interfaces. - The survival equipment shall be compatible for use with all spacecraft missions environments as required.

[redacted]

1. SCOPE

1.1 Scope. - This specification describes the interface requirements for recreational equipment.

2. APPLICABLE DOCUMENTS. - To be determined

3. REQUIREMENTS. - . The requirements for the NASA-furnished recreational equipment have not been determined. Possible interface requirements may exist in the following area:

Space allocation for stowage.

[redacted]

[redacted]

1. SCOPE

1.1 Scope. - This specification describes the interface requirements for exercise equipment.

2. APPLICABLE DOCUMENTS. - To be determined.

3. REQUIREMENTS. - The requirements for exercise equipment have not been determined. Possible interface requirements may exist in the following area:

Space allocation for stowage.

[redacted]

1. SCOPE

1.1 Scope. - This specification describes the interface requirements for first aid equipment.

2. APPLICABLE DOCUMENTS. - To be determined.

3. REQUIREMENTS. - The requirements for first aid equipment have not been determined. Possible interface requirements may exist in the following areas:

Space allocation for crew medical kit stowage.

Space allocation for individual first aid package stowage.

Attachment provision on PGA for first aid package carriage.

[redacted]